

What is claimed is:

- 1 1. A linearizer for correcting gain compression and phase variation
2 of a radio frequency input signal, said linearizer comprising:
3 a radio frequency (RF) input;
4 a splitter coupled to said RF input and receiving the RF input signal, said
5 splitter separating said RF input signal into an in-phase (I) signal and a
6 quadrature (Q) signal, wherein said Q signal is delayed ninety degrees behind
7 said I signal;
8 a first variable gain amplifier (VGA) having an adjustable first gain, said
9 first VGA coupled to said splitter and amplifying said I signal to generate an
10 amplified I signal;
11 a second variable gain amplifier (VGA) having an adjustable second
12 gain, said second VGA coupled to said splitter and amplifying said Q signal to
13 generate an amplified Q signal;
14 a RF power detector coupled to said RF input and receiving the RF input
15 signal, said RF power detector generating an RF power signal corresponding to
16 the power of the RF input signal;
17 a controller coupled to said RF power detector and receiving said RF
18 power signal, said controller including control logic operative to adjust said
19 adjustable first and second gains to control linearization response; and
20 a summer coupled to said first and second VGAs and summing said
21 amplified I and Q signals to generate a linearized RF output.
- 1 2. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 splitter comprises a microwave hybrid transformer.

1 3. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 first VGA comprises a bipolar device.

1 4. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 3, wherein said
3 first VGA comprises a common-emitter amplifier.

1 5. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 second VGA comprises a bipolar device.

1 6. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 5, wherein said
3 second VGA comprises a common-emitter amplifier.

1 7. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 first and second adjustable gains are increased equally, thereby increasing
4 overall gain while keeping phase constant.

1 8. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 first and second adjustable gains are increased differently, thereby modifying
4 overall phase while keeping gain constant.

1 9. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said RF
3 power detector comprises a diode.

1 10. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said RF
3 power detector comprises a logarithmic amplifier.

1 11. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 controller comprises a plurality of bipolar devices.

1 12. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 controller includes control logic operative to adjust said first and second gains
4 base upon a settable reference signal, said settable reference signal
5 corresponding to a set of extrinsic characteristics of a traveling wave tube
6 amplifier.

1 13. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 1, wherein said
3 summer comprises a resistor.

1 14. A satellite communications system, comprising:
2 a ground station;
3 a satellite in orbit and in communication with said ground station, said
4 satellite having a linearizer for correcting gain compression and phase variation
5 of a radio frequency input signal comprising:
6 a radio frequency (RF) input;
7 a splitter coupled to said RF input and receiving the RF input
8 signal, said splitter separating said RF input signal into an in-phase (I)
9 signal and a quadrature (Q) signal, wherein said Q signal is delayed
10 ninety degrees behind said I signal;

11 a first variable gain amplifier (VGA) having an adjustable first
12 gain, said first VGA coupled to said splitter and amplifying said I signal
13 to generate an amplified I signal;
14 a second variable gain amplifier (VGA) having an adjustable
15 second gain, said second VGA coupled to said splitter and amplifying
16 said Q signal to generate an amplified Q signal;
17 a RF power detector coupled to said RF input and receiving the
18 RF input signal, said RF power detector generating an RF power signal
19 corresponding to the power of the RF input signal;
20 a controller coupled to said RF power detector and receiving said
21 RF power signal, said controller including control logic operative to
22 adjust said adjustable first and second gains to control linearization
23 response; and
24 a summer coupled to said first and second VGAs and summing
25 said amplified I and Q signals to generate a linearized RF output.

1 15. The satellite communications system as recited in claim 14,
2 wherein said first VGA comprises a bipolar device.

1 16. The linearizer for correcting gain compression and phase
2 variation of a radio frequency input signal as recited in claim 15, wherein said
3 first VGA comprises a common-emitter amplifier.

1 17. The satellite communications system as recited in claim 14,
2 wherein said second VGA comprises a bipolar device.

1 18. The satellite communications system as recited in claim 17,
2 wherein said second VGA comprises a common-emitter amplifier.

1 19. The satellite communications system as recited in claim 14,
2 wherein said controller comprises a plurality of bipolar devices.

1 20. The satellite communications system as recited in claim 14,
2 wherein said controller includes control logic operative to adjust said first and
3 second gains base upon a settable reference signal, said settable reference signal
4 corresponding to a set of extrinsic characteristics of a traveling wave tube
5 amplifier.